REMARKS

In the Final Official Action mailed 21 June 2004, the Examiner reviewed claims 1-14 and 33-35. The Examiner rejected claims 1, 4-7, 10, 13, 14 and 33-35 under 35 U.S.C. §103(a); claim 3 is rejected under 35 U.S.C. §103(a); and claim 2 and 8 are rejected under 35 U.S.C. §103(a), based primarily on the combination of U.S. Patent 5,405,646 (Nanis I) and U.S. Patent 5,478,657 (Suenaga et al.).

The Examiner issued an Advisory Action on 14 September 2004, finding that arguments presented in response to the Final Official Action did not place the application in condition for allowance. One point made by the Examiner concerns the claim language. In particular, the Examiner mistakenly stated, "Claim 1 under consideration in the final rejection did not include the limitation of "chemical and mechanical variations of the substrate" and thus Applicant's argument based on this limitation has no weight."

In fact, claim 1 included the clause:

"thereby masking chemical and mechanical variations of the substrate."

Thus, the Examiner is mistaken. Perhaps the fact that the clause was removed from another part of the claim led to the mistake. Applicant presents a clarifying amendment to claim 1 herein, unmistakably requiring that the substrate have a surface "characterized by microstructural mechanical variations at and below the surface resulting from smoothing processes."

Applicant respectfully requests reconsideration of the rejection under 35 U.S.C. §103(a) in light of the amendment, and submits a DECLARATION OF INVENTOR UNDER 37 CFR §1.132, setting forth the unexpected results achieved by the present invention, and clarifying the invention and the state of the art for the Examiner.

In the accompanying DECLARATION OF INVENTOR UNDER 37 CFR §1.132, Applicant sets forth the background technology establishing that the microstructural variations that result from polishing have presented a problem in the art that is distinguished from the surface roughness of the metal substrate. The problem solved becomes significant when plating super smooth substrates, hence the claim limitation, but otherwise is unrelated to the smoothness of the substrate surface. Indeed, the microstructural variations that result from polishing cause a

unique and difficult issue for plating a metal substrate with NiP, that is fundamentally different in character from the variations due to chemical impurity inclusions addressed by Nanis I.

One flaw in the prima facie case presented by the Examiner is the reliance on the passage in Suenaga et al. at column 2, lines 47-51, suggesting that a smooth substrate "allows it to be plated with a highly adhesive layer." (Final Official Action, page 6, line 3). In Suenaga et al., the allegedly "highly adhesive layer" is electroplated or electrolessly plated NiP (Suenaga, et al., column 4, lines 31-39, lines 65-67). Thus, rather than suggest combination with Nanis I, the cited excerpt actually suggests that plating directly on the titanium substrate is desirable, leading away from a process like Nanis I, that requires an intermediate layer.

In addition, the Examiner relied upon "overlapping ranges" as a basis for the *prima facie* case of unpatentability. (Final Official Action, page 6, line 4-9). This basis suggests that the Examiner does not understand the problem solved by the present invention. The novelty of the present invention lies in the ability of the claimed process to mask microstructural variations in a substrate caused by polishing. These variations become problematic when one polishes a substrate super smooth, because the variations cause irregularities in the plating process, such that the smoothness of the substrate is not preserved in the plated layer. Accordingly, the fact that Suenaga et al. plated NiP directly on super smooth titanium substrates with allegedly good adhesion results in a narrow range of tolerances, does not suggest use of the claimed process including the vacuum sputter depositing of a intermediate layer to mask microstructural variations on the surface of smooth substrate.

The present invention describes an improved manufacturing method based on two important discoveries. First, the Nanis I process can be applied to successfully bind nickel alloy layers, such as NiP, to the cold-worked surfaces of super smooth metallic substrates, which is non-obvious in its own right. The second discovery, quite unexpected, is that the process results in formation of a nickel alloy layer having surface roughness essentially unchanged from that of the cold worked surface. The present inventor did not invent super smooth substrates, but rather discovered a new manufacturing process that improves the plating process for nickel alloy layers on super smooth substrates with a metallic binder layer, that reduces the amount of polishing required on the NiP layer after deposition to an unexpected degree.

The Nanis I patent describes use of the process to mask impurity elements, intermetallic inclusions, and "localized variations in disk surface chemistry" (see, Nanis I, column 2, line 50-column 3, line 11, column 6, lines 53-56). However, the non-uniformities of a cold worked

surface are mechanical, and of a nature entirely different from the variations in chemistry described in Nanis I. Claim 1 states that the thin metallic layer masks "microstructural variations of the substrate." Nanis I does not suggest that its process should be applied, as claimed herein, to mask the metallic microstructural variations that result from cold working to achieve super smooth surfaces on metallic substrates.

The present invention provides vacuum sputter deposition of a metallic layer to mask the microstructural variations caused by polishing on a super smooth substrate. The suggestion of Nanis I is fundamentally different that that of the present invention. Suenaga et al. teaches that the NiP should be plated directly on the smooth titanium substrate, and achieves poor results.

The present invention is patentable as well because of the unexpected results achieved, as demonstrated in the DECLARATION OF INVENTOR UNDER 37 CFR §1.132. In particular, according to the present invention, the microstructural variations due to polishing at and near the surface are masked by the present invention, and the NiP layer grows as plated very smoothly. As a result, much less polishing of the NiP layer is required, and the benefits of polishing on the substrate prior to plating are carried forth. No prior art process suggests this superior and surprising result. In fact, as demonstrated in the DECLARATION OF INVENTOR UNDER 37 CFR §1.132, the improvements provided by the present invention are dramatic and unexpected.

CONCLUSION

It is respectfully submitted that this application is now in condition for allowance, and such action is respectfully requested.

The Commissioner is hereby authorized to charge any fee determined to be due in connection with this communication, or credit any overpayment, to our Deposit Account No. 50-0869 (NANS 1000-2).

Respectfully submitted,

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Mark A. Haynes, Reg. No. 30,846

HAYNES BEFFEL & WOLFELD LLP
P.O. Box 366
Half Moon Bay, CA 94019
(650) 712-0340 phone
(650) 712-0263 fax